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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/637,193	08/08/2003	Wolfgang Henke	P2002,0659	3960

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EXAMINER
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CHACKO DAVIS, DABORAH

ART UNIT	PAPER NUMBER
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1756

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/22/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

# Office Action Summary

Application No.

10/637,193

Applicant(s)

HENKE ET AL.

Examiner

Daborah Chacko-Davis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2006.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.  
4a) Of the above claim(s) 9-12 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-8 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 5-8, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,094,305 (Shiraishi) in view of U. S. Patent No. 5,673,103 (Inoue et al., hereinafter referred to as Inoue).

Shiraishi, in col 7, lines 54-67, in col 8, lines 1-64, in col 9, lines 28-67, in col 10, lines 1-32, in col 11, lines 1-14, and lines 55-64, discloses a method of using an illumination source in an exposure apparatus comprising a reticle stage, a mirror, a lens system, and a wafer placed on a wafer stage (substrate plane), providing a reticle that has an opaque layer on one side (chromium films), and aperture openings on the other side (slit, second side), illuminating the opaque layer (dielectric thin films) to form an interference pattern of the opening on the mask, imaging the interference pattern via a projection optical system and focusing and projecting the image onto the wafer and characterizing the illumination source (respective light components) based on the pattern image formed. Shiraishi, in col 5, lines 7-45, in col 16, lines 37-67, in col 17, lines 1-44, in col 22, lines 4-16, discloses determining the contrast of the interference fringes (interference pattern) from the image pattern formed on the wafer, estimating a

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contrast function (a variable "a") from the width of the openings (transmitting openings) (distance between the slits), and the contrast determined, determining the intensity distribution of light based on a Fourier transform plane with respect to a pattern of the mask (claims 1-2, 5, and 8 ). Shiraishi, in col 7, lines 55-67, in col 11, lines 16-30, in col 16, lines 57-60, discloses determining the wavelength of the light generated by the illumination source, determining the NA of the optical system, performing illumination via a mask wherein the thickness of the opaque layer (pitch, thickness of the thin dielectric film), and the width (W) of the openings (slit width, and/or the distance between the openings) are adjusted such that ratio of i) the width to the pitch (thickness) or ii) the distance to the depth of the patterns in the mask is less than the wavelength employed (claims 6-7).

The difference between the claims and Shiraishi is that Shiraishi does not disclose that the opaque layer formed on the mask surface faces the illumination source.

Inoue, in col 13, lines 2-9, and in figure 13A, and 13B, discloses positioning a light shielding film (opaque layer) on the mask surface side facing the illumination source.

Therefore, it would be obvious to a skilled artisan to modify Shiraishi by positioning a light shielding film on the surface of the mask facing towards the illumination source because Inoue, in col 13, lines 10-221, discloses that applying the light shielding film prevents the phase difference occurrence of edge portions and thus avoids the formation of unnecessary dark portions.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,094,305 (Shiraishi) in view of U. S. Patent No. 5,673,103 (Inoue et al., hereinafter referred to as Inoue) as applied to claims 1-2, and 5-8, above, and further in view of U. S. Patent No. 4,885,232 (Spak).

Shiraishi in view of Inoue is discussed in paragraph no. 2.

Shiraishi, in col 1, lines 16-22, in col 18, lines 11-51, discloses that a positive photoresist coated wafer is photolithographically patterned (exposed, developed, exposed portions removed to form a pattern, recording of the image signal) (claim 3).

The difference between the claims and Shiraishi in view of Inoue is that Shiraishi in view of Inoue does not disclose that the height profile of the unexposed portions of the photoresist is subsequently measured with a microscope.

Spak, in col 7, lines 14-49, discloses that the surface profilometry of the patterned positive photoresist is observed through a microscope.

Therefore, it would be obvious to a skilled artisan to modify Shiraishi in view of Inoue by employing the method of measuring the wall profile of the patterned photoresist as taught by Spak because Spak, in col 7, lines 32-49, discloses that the microscope enables the observation of the micron size lines (pattern) at a magnification of 10,000 times, and enables comparisons of the different lines and their irregularities in slope or size produced at different exposure parameters.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,094,305 (Shiraishi) in view of U. S. Patent No. 5,673,103 (Inoue et al.,

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hereinafter referred to as Inoue) as applied to claims 1-2, and 5-8, above, and further in view of U. S. Patent No. 6,699,628 (Shima).

Shiraishi in view of Inoue is discussed in paragraph no. 2.

The difference between the claims and Shiraishi in view of Inoue is that Shiraishi in view of Inoue does not disclose that a sensor is moved in the substrate plane during the imaging process (recording of the image signal) (claim 4).

Shima, in col 7, lines 45-58, in col 8, lines 20-35, discloses that during the exposure processing (imaging the wafer via a mask) an interferometer (a sensor, reference 18 of figure 1, detector) is positioned parallel to the wafer surface near the wafer stage (in the substrate plane).

Therefore, it would be obvious to a skilled artisan to modify Shiraishi in view of Inoue by employing the interferometer suggested by Shima because Shima, in col 8, lines 20-26, discloses that the interferometer positioned proximate the substrate stage enables the constant detection of the wafer stage in an X-Y plane at a resolution of about  $0.01\mu$ .

### ***Response to Arguments***

5. Applicant's arguments filed November 28, 2006, have been fully considered but they are not persuasive. The 103 rejections made in the previous office action (paper no. 20060918) are maintained.

A) Applicants argue that neither Shiraishi nor Inoue teaches an opaque layer having two parallel slits.

Shiraishi teaches an opaque layer with at least two apertures (slits) that are formed on one surface of the opaque layer. However, Shiraishi does not teach that the opaque layer faces the illumination source. Inoue is depended upon to disclose the opaque layer with openings (i.e., slits) that faces the illumination source (see column 13, lines 10-21). Inoue does not teach that the analyzer is the light shielding film or opaque film. Inoue teaches that the light-shielding portion that faces the illumination source has periodic openings (slits).

B) Applicants argue that both Shima and Spak fail to show the feature of the mask being reversed in the mask mount.

Shima and Spak are not depended upon to disclose "features of the mask being reversed in the mask mount". Additionally, the instant claims recite "introducing the mask into the mask mount with the opaque layer facing the illumination source". Inoue is depended upon to disclose the claimed feature. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., features of the mask being reversed in the mask mount) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For



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more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

February 13, 2007.

A handwritten signature in black ink, appearing to read "Mark F. Huff", with a long, sweeping horizontal line extending to the right.

MARK F. HUFF  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700